

**REMARKS**

The Office Action of August 25, 2009 has been reviewed and the comments therein carefully considered. No amendments to this application have been made in response to the Office Action. Accordingly, claims 13-18 and 20-22 remain pending, of which claims 13 and 20 are in independent form. For the following reasons, Applicants respectfully traverse the rejections made in the Office Action and contend that the claims are in condition for allowance.

Claims 13-15 and 17-18 stand rejected under 35 U.S.C. §103(a) for obviousness over U.S. Patent No. 3,912,624 to Jennings in view of U.S. Patent No. 4,740,308 to Fremont et al. and U.S. Patent No. 4,970,005 to Schuchardt. This rejection is respectfully traversed.

Jennings is directed to a method of cleaning accumulated solids from a membrane. (Col. 1, lines 2-3.) The method uses water droplets and a pressurized, high speed air stream to effect membrane surface cleaning. (Col. 1, lines 43-46.) Jennings posits that his method is an improvement over methods using higher volumes of water or cleaning liquids. (Col. 1, lines 38-40.) In the Background section, Jennings suggests that such cleaning liquids which are used in conventional cleaning systems "may, for example, comprise a mild hypochlorous acid solution or an iodine phosphoric acid complex, or various of the cleaning agents used in the dairy industry to remove molds and various bacteriological growths." (Col. 1, lines 31-35.) Jennings, also in the Background section, provides that "it is conventional to periodically back-flush the units and clean membrane surfaces with a cleaning flow stream." (Col. 1, lines 13-16.) However, despite the discussion of "conventional cleaning methods," the crux of the Jennings patent is the "improved" method that uses pressurized air and, optionally, small amounts of liquid droplets. In this respect, Jennings disparages the conventional, "time consuming" methods which use slower moving liquid flows containing cleaning chemicals and back-flushing.

The Office Action cites Jennings as suggesting that it is conventional to periodically back-flush and clean membrane surfaces. The Office Action further cites Jennings as suggesting that it is conventional in the membrane separation field to use certain additives and cleaning agents, such as the cleaning liquids containing a mild hypochlorous acid disclosed in Jennings. The Office Action admits that Jennings fails to teach a method of removing protein or polyphenol from a membrane or a membrane made from polymer.

Jennings also fails to suggest the use of a cleaning process that uses a peroxide compound in the presence of a transition metal.

Fremont is cited in the Office Action as disclosing a process of cleaning a separation membrane by contacting it with an inorganic peroxide and rinsing it with alkali metal hydroxide. Schuchardt is cited in the Office Action as disclosing a method of treating wastewater by reacting wastewater with an oxidizing agent such as hydrogen peroxide and optionally with a transition metal catalyst.

The Office Action contends that it would have been obvious to include a transition metal catalyst agent into the process of Jennings because Schuchardt discloses that transition metal catalysts degrade higher molecular weight polyols to lower molecular weight polyols. However, Schuchardt is not even directed to treating membranes, much less membranes used in the beverage industry. Instead, Schuchardt is directed to treating wastewater by adding chemical compounds directly to wastewater. Jennings, however, as discussed above, is directed to a process of treating membranes using minimal amounts of liquid droplets and high pressure air and specifically disparages the use of large volumes of cleaning liquids. Thus, one skilled in the art reading Jennings and Schuchardt would not have made the asserted combination since the patents are directed to the treatment of different types of objects (i.e., membranes vs. wastewater streams) and Jennings specifically teaches away from the use of large volumes of slow moving cleaning liquids when cleaning membranes.

Fremont is directed to a process of cleaning fouled separation membranes that have been used in processes such as pulp and paper manufacturing. In particular, Fremont notes that biologically active potential foulants, such as slimes, scales and humic acid, may build up when a membrane is used to filter an untreated, raw water draw. (Col. 2, line 2-7.) Fremont further reports that such membranes can be treated by exposure to an inorganic peroxide and an alkali metal or alkaline earth metal hypohalite to effect cleaning. (Col. 2, lines 56-68.) Contact of the membrane by the reactants can be achieved by, for example, immersion, spraying, solution recirculation and the like. (Col. 4, lines 18-20.)

Fremont, however, is not directed to treatment of membranes used in the beverage industry. This distinction is significant, because, as explained beginning on page 2 of the application as filed, the fouling which occurs during beverage production has certain characteristics. For instance, during the beverage filtration process, membrane fouling starts

with a complexation onto the membrane of polyphenols and proteins. Subsequently, other components, such as (poly)saccharides and/or other hydrophilic residues adsorb onto the polyphenol protein complexes, causing the membrane pores to be blocked. Applicants have found a novel method of cleaning these membranes by targeting the polyphenol protein complexes with an oxidizing agent, such as a transition metal complex, together with a peroxide compound. As discussed on page 3 of the application as filed, Applicants have further found that a back-washing step is beneficial because research has revealed that the polyphenol protein complex is directly attached through physical bonds to the membrane surface allowing the use of oxidative chemicals to directly target the polyphenol protein complex. Fremont, which does not discuss the type of fouling occurring in the beverage industry, accordingly does not provide an understanding of the particular features of polyphenol protein fouling or suggest the ways of dealing with this fouling discovered by Applicants.

With this background in mind, the assertion in the Office Action that one skilled in the art would find it obvious to combine the disclosures of Jennings, Schuchardt and Fremont to arrive at Applicants' claimed invention is not sufficient to establish a *prima facie* case of obviousness. As mentioned above, Jennings is primarily directed to a process using high velocity air to clean membrane surfaces. Schuchardt is not directed to cleaning membrane surfaces at all, but instead is directed to treating wastewater streams by direct application of different chemicals to the stream. Fremont is directed to treating fouled membranes, but the specific type of fouling that is asserted to be treating is the fouling that occurs due to humic acid and other compounds found in raw water feeds. Fremont also fails to suggest back-flushing the membrane and instead discusses immersing the membrane in solution.

On the other hand, Applicants' research into the type of fouling that occurs in the beverage industry, and in particular the understanding that residues containing water insoluble proteins and/or polyphenols attach to the filter, and methods of effectively and safely removing such foulants, has led them to develop the method claimed. This method would not be obvious in view of the cited triple combination of references because it would not be obvious to pick and choose the features of unrelated art (none of which are directed to cleaning membranes in the beverage industry) to recreate Applicants' claimed method. Instead, as demonstrated through the specification and recited in the claims, Applicants have

discovered a new and surprisingly improved method of cleaning membranes used in the beverage industry having residues containing water-insoluble proteins and/or polyphenols and polysaccharides through a TEMPO-free process by contacting the protein and/or polyphenol containing residues with an oxidizing agent through back-flushing.

Because the cited references, whether considered alone or in combination, fail to obviate claims 13-15 and 17-18, the rejection of these claims under 35 U.S.C. §103(a) should be reconsidered and withdrawn.

Claim 16 stands rejected under 35 U.S.C. §103(a) for obviousness over Jennings in view of Fremont and Schuchardt and further in view of U.S. Patent No. 5,667,690 to Doddema et al. Claim 16 depends from claim 13. For the reasons set forth above, claim 13 is patentable over Jennings, Fremont, and Schuchardt. The additional cited patent to Doddema is alleged to disclose a method of removing phenols from wastewater by treating the wastewater with a complex of a transition metal and a polyamine in the presence of the peroxide peracid. (See Office Action, page 4.) However, the disclosure of Doddema, like Schuchardt, is primarily directed to treating wastewater rather than membranes. Thus, the rejection of claim 16 in further view of Doddema fails for much the same reason as the rejection of claim 13.

Claims 20-22 stand rejected under 35 U.S.C. §103(a) for obviousness over Jennings in view of Fremont.

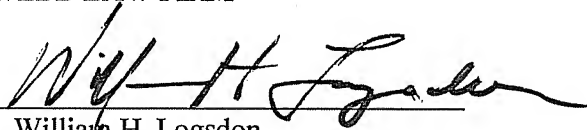
Claim 20 (from which claims 21-22 depend) like claim 13, is directed to a process of cleaning a polymer membrane filter containing residues from filtering beverages where the residues contain water-insoluble proteins and/or polyphenols attached to the filter and polysaccharides. The method includes a step of contacting the protein and/or polyphenol residues with a hypohalous acid solution by back-flushing. As explained above, Jennings is directed to a method which primarily uses high pressure air flow while Fremont is directed to a method of cleaning membranes used to filter raw water by immersing the membrane into a chemical solution, which is essentially the type of cleaning method that Jennings teaches away from. Thus, the combination of these references would not be obvious to one skilled in the art. Moreover, the use of these references to develop a process of cleaning membranes used in the beverage industry containing the residues recited in the claims would not be obvious to one skilled in the art for the reasons discussed above.

Application No. 10/519,639  
Paper Dated: October 26, 2009  
In Reply to USPTO Correspondence of August 25, 2009  
Attorney Docket No. 0470-048036

For the foregoing reasons, Applicants submit that the pending claims are patentable over the cited documents of record and are in condition for allowance. Therefore, reconsideration of the outstanding rejections and allowance of pending claims 13-18 and 20-22 are respectfully requested.

Respectfully submitted,  
THE WEBB LAW FIRM

By



William H. Logsdon  
Registration No. 22,132  
Attorney for Applicants  
436 Seventh Avenue  
700 Koppers Building  
Pittsburgh, PA 15219  
Telephone: (412) 471-8815  
Facsimile: (412) 471-4094  
E-mail: [webblaw@webblaw.com](mailto:webblaw@webblaw.com)